

## Part IV. Plant Assessment Form

For use with "Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado's Wildlands and Agriculture"

By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

**Table 1. Species and Evaluator Information**

<b>Species name</b> (Latin binomial):	<b>Eichhornia crassipes</b>
<b>Synonyms:</b>	Eichhornia speciosa, Heteranthera formosa, Piaropus crassipes, Pontederia crassipes
<b>Common names:</b>	water hyacinth
<b>Evaluation date</b> (mm/dd/yy):	1/23/10
<b>Evaluator #1 Name/Title:</b>	Joseph Vassios/Graduate Research Assistant
<b>Affiliation:</b>	Colorado State University
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<b>Evaluator #2 Name/Title:</b>	Scott Nissen
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Section below for list committee use—please leave blank

<b>List committee members:</b>	enter text here
<b>Committee review date:</b>	enter text here
<b>List date:</b>	enter text here
<b>Re-evaluation date(s):</b>	enter text here

**General comments on this assessment:**

Agriculture and Human Impact - 5 pts - B

Overall Agricultural Score - Moderate, Red Alert

**Table 2. Criteria, Section, and Overall Scores**

<a href="#"><u>1.1</u></a>	Impact on abiotic ecosystem processes	<b>A</b>	Rev'd, Sci. Pub'n	<b>Impact</b> Enter four characters from Q1.1-1.4 below: <b>AACD</b> Using matrix, determine score and enter below: <b>A</b>	
<a href="#"><u>1.2</u></a>	Impact on plant community	<b>A</b>	Rev'd, Sci. Pub'n		
<a href="#"><u>1.3</u></a>	Impact on higher trophic levels	<b>C</b>	Rev'd, Sci. Pub'n		
<a href="#"><u>1.4</u></a>	Impact on genetic integrity	<b>D</b>	Other Pub. Mat'l		
<a href="#"><u>2.1</u></a>	Role of anthropogenic and natural disturbance	<b>A (3 pts)</b>	Other Pub. Mat'l	<b>Invasiveness</b> Enter the sum total of all points for Q2.1-2.7 below: <b>16</b> Use matrix to determine score and enter below: <b>B</b>	<b>Wildlands Plant Score</b> Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below: <b>High Red Alert</b>
<a href="#"><u>2.2</u></a>	Local rate of spread with no management	<b>A (3 pts)</b>	Other Pub. Mat'l		
<a href="#"><u>2.3</u></a>	Recent trend in total area infested within state	<b>C (1 pt)</b>	Other Pub. Mat'l		
<a href="#"><u>2.4</u></a>	Innate reproductive potential <a href="#"><u>Wksht A</u></a>	<b>A (3 pts)</b>	Rev'd, Sci. Pub'n		
<a href="#"><u>2.5</u></a>	Potential for human-caused dispersal	<b>B (2 pts)</b>	Other Pub. Mat'l		
<a href="#"><u>2.6</u></a>	Potential for natural long-distance dispersal	<b>B (2 pts)</b>	Anecdotal		
<a href="#"><u>2.7</u></a>	Other regions invaded	<b>B (2 pts)</b>	Other Pub. Mat'l		
<a href="#"><u>3.1</u></a>	Ecological amplitude/Range	<b>U</b>	Other Pub. Mat'l	<b>Distribution</b> Using matrix, determine score and enter below: <b>U</b>	
<a href="#"><u>3.2</u></a>	Distribution/Peak frequency <a href="#"><u>Wksht B</u></a>	<b>U</b>	Other Pub. Mat'l		

<a href="#"><u>4.1</u></a>	Poisonous to livestock	<b>D (0 pts)</b>	<b>Rev'd, Sci. Pub'n</b>
<a href="#"><u>4.2</u></a>	Detrimental to economic crops	<b>C (1 pt)</b>	<b>Observational</b>
<a href="#"><u>4.3</u></a>	Detrimental to management of agricultural system, rangeland and pasture	<b>C (1 pt)</b>	<b>Other Pub. Mat'l</b>
<a href="#"><u>4.4</u></a>	Human impacts <a href="#"><u>Wrksht C</u></a>	<b>A (3 pts)</b>	<b>Observational</b>

**Table 3. Documentation**

<b>Question 1.1</b> Impact on abiotic ecosystem processes	A Rev'd, Sci. Pub'n <a href="#">back</a>
Identify ecosystem processes impacted: Will alter water flow, water chemistry, light availability, and turbidity when present.	
Rationale: Can have a very rapid growth rate and will form very dense mats. These dense mats can clog waterways, increase the amount of suspended organic matter, and increase turbidity. May also alter dissolved oxygen, temperature, pH, and decreased light availability. Can remove pollutants from water.	
<p>Sources of information: DiTomaso, JM, EA Healy. 2003. Aquatic and Riparian Weeds of the West. University of California Agriculture and Natural Resources.</p> <p>Rommens, W., J Mae, N Dekeza, P Inghelbrecht, N Nhiwatiwa, E Holsters, F Ollevier, B Marshall, L Brendock. 2003. The impact of water hyacinth (Eichhornia crassipes) in a eutrophic suprotropical impoundment (Lake Chivero, Zimbabwe). I. Water quality. Archive Feur Hydrobiologie. 158(3): 373-388.</p>	
<b>Question 1.2</b> Impact on plant community composition, structure, and interactions	A Rev'd, Sci. Pub'n <a href="#">back</a>
Identify type of impact or alteration: Can decrease species richness and plant diversity of native submersed plants. Can increase the levels of algae present in water bodies. Large mats may also crush shoreline species.	
Rationale: Decreased light availability can lead to a decrease in or elimination of submersed macrophytes. Lack of these macrophytes may lead to an increase in turbidity and more readily available nutrients. Increased nutrients in the water column are believed to lead to increases in blue green algae populations.	
<p>Sources of information: DiTomaso, JM, EA Healy. 2003. Aquatic and Riparian Weeds of the West. University of California Agriculture and Natural Resources.</p> <p>Rommens, W., J Mae, N Dekeza, P Inghelbrecht, N Nhiwatiwa, E Holsters, F Ollevier, B Marshall, L Brendock. 2003. The impact of water hyacinth (Eichhornia crassipes) in a eutrophic suprotropical impoundment (Lake Chivero, Zimbabwe). I. Water quality. Archive Feur Hydrobiologie. 158(3): 373-388.</p> <p>Gettys, LA, WT Haller, M Bellaud. 2009. Biology and control of aquatic plants: a best management practices handbook. Aquatic Ecosystem Restoration Foundation, Marietta GA.</p>	
<b>Question 1.3</b> Impact on higher trophic levels	C Rev'd, Sci. Pub'n <a href="#">back</a>
Identify type of impact or alteration: Can lead to the elimination of habitats for animals that depend on native species for survival. May provide habitat for small fish. Provides habitat for mosquitoes.	
Rationale: Shading of native submersed species and displacement of native floating species can negatively impact macro-invertebrates and fish that rely on native species for food or shelter. It has also been found that water hyacinth mats can provide habitat for macro-invertebrates and small fish. The mats also provide an ideal habitat for mosquitoes.	
Sources of information: DiTomaso, JM, EA Healy. 2003. Aquatic and Riparian Weeds of the West. University	

<p>of California Agriculture and Natural Resources.</p> <p>Rommens, W., J Mae, N Dekeza, P Inghelbrecht, N Nhiwatiwa, E Holsters, F Ollevier, B Marshall, L Brendock. 2003. The impact of water hyacinth (<i>Eichhornia crassipes</i>) in a eutrophic suprotropical impoundment (Lake Chivero, Zimbabwe). I. Water quality. <i>Archiv für Hydrobiologie</i>. 158(3): 373-388.</p> <p>Gettys, LA, WT Haller, M Bellaud. 2009. Biology and control of aquatic plants: a best management practices handbook. Aquatic Ecosystem Restoration Foundation, Marietta GA.</p>	
<b>Question 1.4</b> Impact on genetic integrity	D Other Pub. Mat'l <a href="#">back</a>
Identify impacts: There are no known <i>Eichhornia</i> species in Colorado that would allow for hybridization.	
Rationale: <i>Eichhornia</i> species are native to South America, and no other species of the genus are known to exist in Colorado.	
<p>Sources of information: Gettys, LA, WT Haller, M Bellaud. 2009. Biology and control of aquatic plants: a best management practices handbook. Aquatic Ecosystem Restoration Foundation, Marietta GA.</p> <p>USDA Plants Database. 2010. <i>Eichhornia crassipes</i>. Accessed online Jan. 23.  <a href="http://plants.usda.gov/java/profile?symbol=EICR">http://plants.usda.gov/java/profile?symbol=EICR</a></p>	
<b>Question 2.1</b> Role of anthropogenic and natural disturbance in establishment	A Other Pub. Mat'l <a href="#">back</a>
Describe role of disturbance: Still water conditions can provide an area for plants to establish.	
Rationale: The building of dams may create still water conditions that are favorable for water hyacinth growth, but disturbance is not required for establishment.	
Sources of information: DiTomaso, JM, EA Healy. 2003. <i>Aquatic and Riparian Weeds of the West</i> . University of California Agriculture and Natural Resources.	
<b>Question 2.2</b> Local rate of spread with no management	A Other Pub. Mat'l <a href="#">back</a>
Describe rate of spread: Possesses the ability to spread very rapidly.	
Rationale: Vegetative spread is very rapid and under favorable conditions daughter plants can appear in as little as 5 days. Populations can double in size in as little as 6-18 days.	
Sources of information: DiTomaso, JM, EA Healy. 2003. <i>Aquatic and Riparian Weeds of the West</i> . University of California Agriculture and Natural Resources.	
<b>Question 2.3</b> Recent trend in total area infested within state	C Other Pub. Mat'l <a href="#">back</a>
Describe trend: Does not occur in Colorado except as an ornamental.	
Rationale: Has been reported growing in an irrigation canal in the San Luis Valley, but not established outside of	

a controlled area. Sold around the state as an ornamental.	
Sources of information: USDA Plants Database. 2010. <i>Eichhornia crassipes</i> . Accessed online Jan. 23. <a href="http://plants.usda.gov/java/profile?symbol=EICR">http://plants.usda.gov/java/profile?symbol=EICR</a> Joseph Vassios. 2010. Personal Observation	
<b>Question 2.4</b> Innate reproductive potential	A Rev'd, Sci. Pub'n <a href="#">back</a>
Describe key reproductive characteristics: Produces large amounts of viable seed that can allow it to overwinter in temperate climates. Also reproduces vegetatively.	
Rationale: Can flower and start to produce seed in as little as 3-4 months. Flowering can last 5-9 months in North America. Production of viable seeds can allow the plants to re-establish every year in temperate climates. Seeds may remain viable for 15-20 years. Fragments as small as 1.5 cm and rhizomes can establish new plants. Vegetative reproduction through stolons occurs rapidly producing daughter plants in as little as 5 days, and doubling the size of an infestation in as little as 6-18 days.	
Sources of information: DiTomaso, JM, EA Healy. 2003. <i>Aquatic and Riparian Weeds of the West</i> . University of California Agriculture and Natural Resources. Gettys, LA, WT Haller, M Bellaud. 2009. <i>Biology and control of aquatic plants: a best management practices handbook</i> . Aquatic Ecosystem Restoration Foundation, Marietta GA. Barrett, SCH. 1980. Sexual reproduction in <i>Eichhornia crassipes</i> (water hyacinth): I. Fertility of clones from diverse regions. <i>Journal of Applied Ecology</i> . 17: 101-112. Barrett, SCH. 1980. Sexual reproduction in <i>Eichhornia crassipes</i> (water hyacinth): II. Seed production in natural populations. <i>Journal of Applied Ecology</i> . 17: 113-124.	
<b>Question 2.5</b> Potential for human-caused dispersal	B Other Pub. Mat'l <a href="#">back</a>
Identify dispersal mechanisms: May be introduced by humans as an ornamental or transported between water bodies by boats or recreational equipment.	
Rationale: Is believed to have been introduced in the United States as an ornamental that either escaped or was intentionally placed in larger water bodies. Plants may be moved between water bodies on boats or recreational equipment.	
Sources of information: Gettys, LA, WT Haller, M Bellaud. 2009. <i>Biology and control of aquatic plants: a best management practices handbook</i> . Aquatic Ecosystem Restoration Foundation, Marietta GA.	
<b>Question 2.6</b> Potential for natural long-distance dispersal	B Anecdotal <a href="#">back</a>
Identify dispersal mechanisms: May be capable of long-distance movement if flowing water or dredging occur.	
Rationale: Since this species floats on the water surface, wind or water flow may spread plants over long distances. Also, seeds may be transported long distances if populations occur in flowing water (canals, rivers,	

streams), or if seeds are in sediment removed by dredging.	
Sources of information: Joseph Vassios. 2010. Personal Observation.	
<b>Question 2.7</b> Other regions invaded	B Other Pub. Mat'l <a href="#">back</a>
Identify other regions: Is capable of establishing in a wide range of aquatic systems.	
Rationale: Is capable of establishing in lakes, ponds, canals, streams, and rivers. Is capable of establishing in still or slow moving waters.	
Sources of information: DiTomaso, JM, EA Healy. 2003. Aquatic and Riparian Weeds of the West. University of California Agriculture and Natural Resources.	
<b>Question 3.1</b> Ecological amplitude/Range	U Other Pub. Mat'l <a href="#">back</a>
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: No escapes or introductions have been identified in Colorado.	
Rationale: Has only been seen growing as an ornamental in the state of Colorado.	
Sources of information: USDA Plants Database. 2010. Eichhornia crassipes. Accessed online Jan. 23. <a href="http://plants.usda.gov/java/profile?symbol=EICR">http://plants.usda.gov/java/profile?symbol=EICR</a>	
<b>Question 3.2</b> Distribution/Peak frequency	U Other Pub. Mat'l <a href="#">back</a>
Describe distribution: Does not occur, except as an ornamental, at this time.	
Rationale: enter text here	
Sources of information: USDA Plants Database. 2010. Eichhornia crassipes. Accessed online Jan. 23. <a href="http://plants.usda.gov/java/profile?symbol=EICR">http://plants.usda.gov/java/profile?symbol=EICR</a>	
<b>Question 4.1</b> Poisonous to Livestock	D Rev'd, Sci. Pub'n <a href="#">back</a>
Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: Not likely toxic to livestock. Has been studied as a possible livestock feed.	
Rationale: Trials have concluded that water hyacinth could be a potential livestock feed.	
Sources of information: Banerjee, A, S Matai. 1990. Composition of Indian aquatic plants in relation to utilization as animal forage. Journal of Aquatic Plant Management. 28: 69-73.	



<b>Question 4.2</b> Detrimental to Economic Crops		C Observational <a href="#">back</a>
Describe impacts to all aspects of cropping systems (see guidelines): If present in irrigation canals, may cause issues with water delivery.		
Rationale: enter text here		
Sources of information: Joseph Vassios. 2010. Personal Observation.		
<b>Question 4.3</b> Detrimental to Mgmt of Agricultural System, Rangeland and Pasture		C Other Pub. Mat'l <a href="#">back</a>
Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Can impact flow of irrigation canals.		
Rationale: If present in canals, may provide a physical barrier to water flow and delivery. May also clog irrigation equipment.		
Sources of information: Gettys, LA, WT Haller, M Bellaud. 2009. Biology and control of aquatic plants: a best management practices handbook. Aquatic Ecosystem Restoration Foundation, Marietta GA.		
<b>Question 4.4</b> Human Health Impacts		A Observational <a href="#">back</a>
Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: Infestations in bodies of water may lead to decreased property values. May also interfere with recreational activities and harbor insects such as mosquitoes. Since sold as an ornamental, may negatively impact the horticulture industry.		
Rationale: enter text here		
Sources of information: Joseph Vassios. 2010. Personal Observation.		

## Worksheet A

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Reaches reproductive maturity in 2 years or less	<b>Yes: 1 pt</b>
Dense infestations produce >1,000 viable seed per square meter	<b>Yes: 2 pts</b>
Populations of this species produce seeds every year.	<b>Yes: 1 pt</b>
Seed production sustained over 3 or more months within a population annually	<b>Yes: 1 pt</b>
Seeds remain viable in soil for three or more years	<b>Yes: 2 pts</b>
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<b>No: 0 pt</b>

Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<b>Yes: 1 pt</b>
Fragments easily and fragments can become established elsewhere	<b>Yes: 2 pts</b>
Resprouts readily when cut, grazed, or burned	<b>Unknown: 0 pts</b>
	<b>10 pts      1 unknown</b>
	<b>A (6+ pts)</b>
<b>Note any related traits:</b> enter text here	

## Worksheet B - Colorado Ecological Types and Land Use

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Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
Freshwater and Aquatic Systems	lakes, ponds, reservoirs	Unknown
	rivers, streams, canals	Unknown
Riparian and wetlands	Riparian forest	Unknown
	Riparian shrublands	Unknown
	Wet meadows	Unknown
Grasslands	Shortgrass prairie	Unknown
	Tallgrass prairie	Unknown
	Sandsage prairie	Unknown
	Montane meadows	Unknown
Irrigated Agriculture	Hay meadows	Unknown
	Irrigated crops (alfalfa, corn, sugar beets)	Unknown
Dryland Agriculture	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	Unknown
Developed Lands	Urban, exurban, industrial	Unknown
Arid Shrublands	Sagebrush shrublands	Unknown
	Foothills shrublands	Unknown
	Gambel oak shrublands	Unknown
Woodlands	Pinyon - juniper	Unknown
	Ponderosa pine	Unknown
	Limber pine	Unknown
Forest	Lodgepole pine	Unknown
	Spruce-fir	Unknown
Alpine	Boulder and rock fields	Unknown
	Dwarf shrublands	Unknown
	Tundra	Unknown
Barrens (lower elevation)	Dunes	Unknown
	Rock outcrops	Unknown
	Canyonlands	Unknown

\* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).

## Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	<b>No: 0 pt</b>
Property values are decreased due to increased risk of fire	<b>No: 0 pts</b>
Decreased property value due to moderate to heavy infestations	<b>Yes: 2 pts</b>
Decreased land value for recreational use; boating, fishing, camping, etc.	<b>Yes: 1 pt</b>
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	<b>Yes: 2 pt</b>
	<b>5 pts      Total Unknowns</b>
	<b>A (4+ pts)</b>
<b>Note any related traits:</b> enter text here	